

FIG.1
PRIOR ART

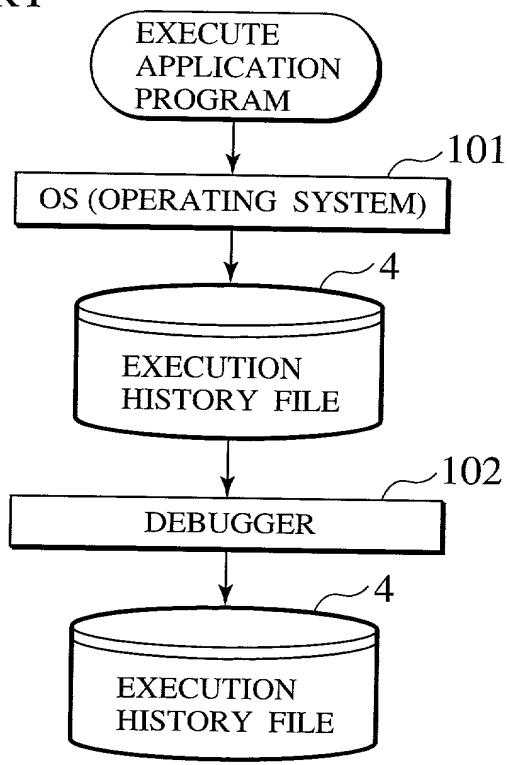


FIG.2
PRIOR ART

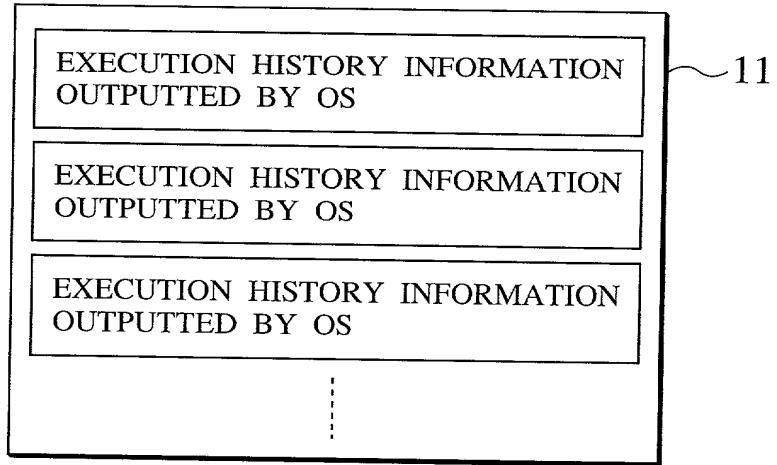


FIG.3A

PRIOR ART

type	oid	sysid	obj
------	-----	-------	-----

FIG.3B

PRIOR ART

6	0	1	...	(i)
1	1	-9	2	...
1	1	-9	3	...
1	1	-17		...
6	1	3		...
1	3	-19	1	...
6	3	1		...
...				

WHERE
 sysid : sta_txt ... -9
 : ext_txt ... -10
 : slp_txt ... -17
 : wup_txt ... -19

FIG.4

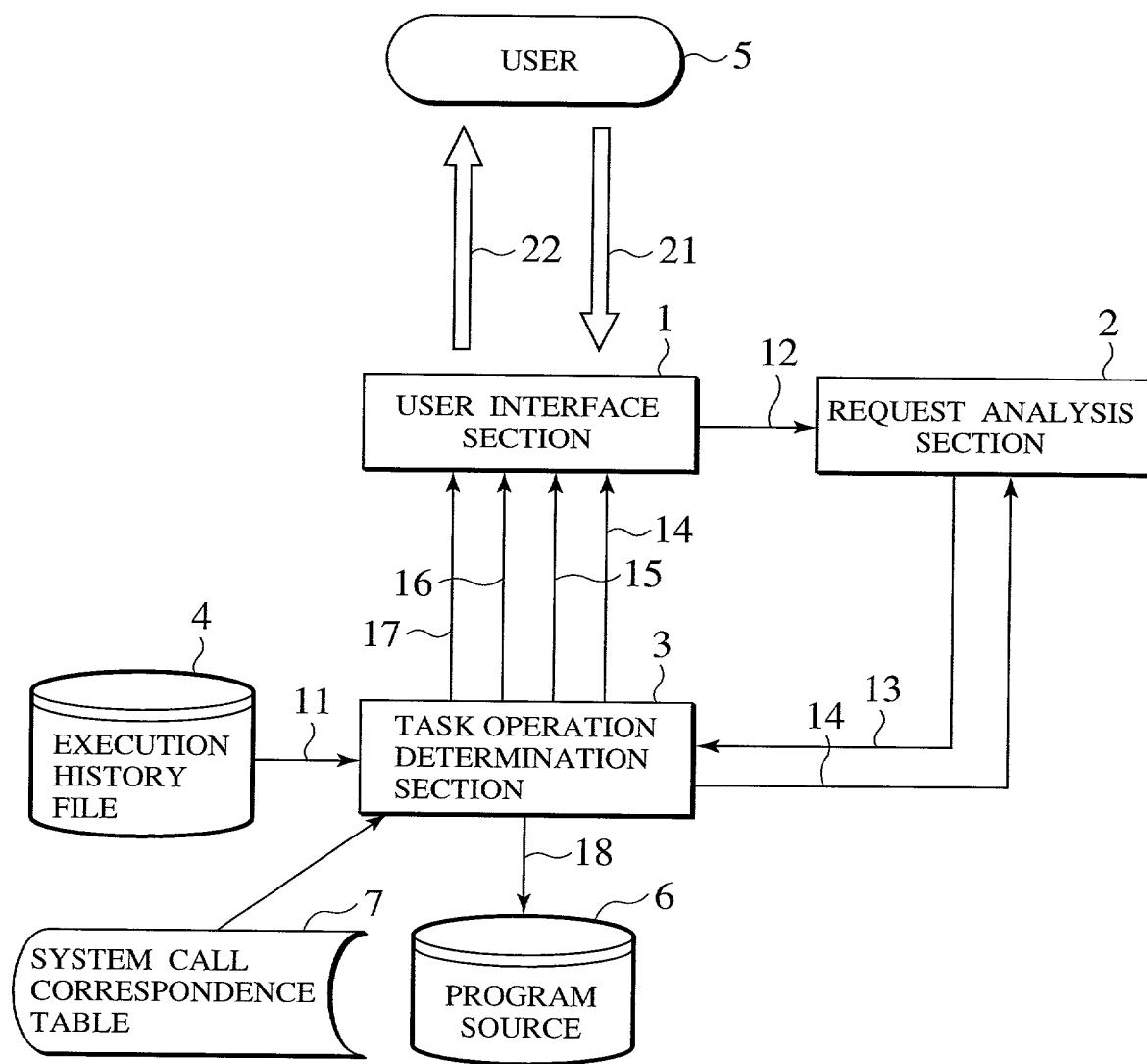
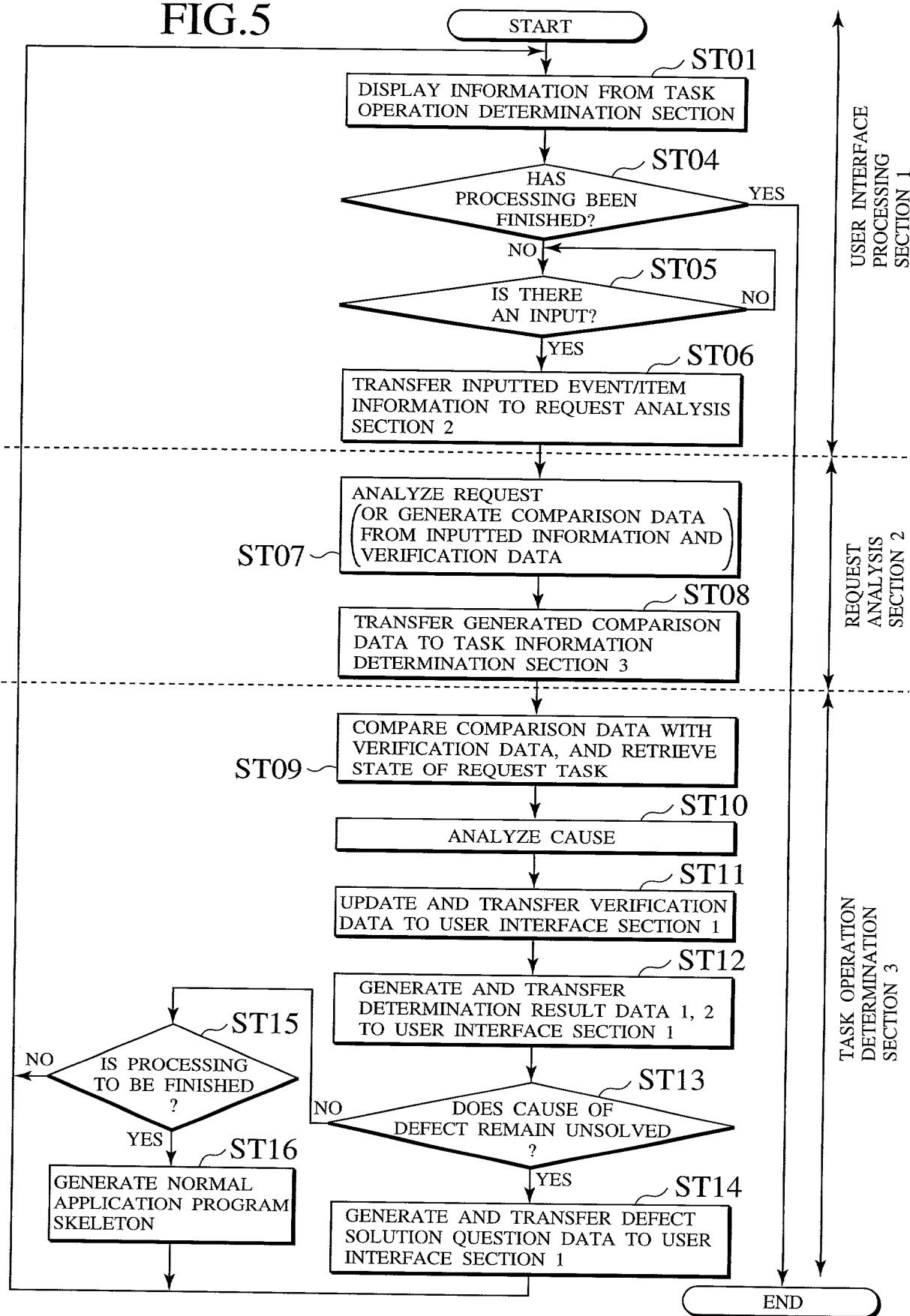


FIG.5

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FIG.6

ORDER OF EVENTS	EVENT ATTRIBUTE (ISSUANCE OF SYSTEM CALL)	ISSUED SYSTEM CALL	ISSUANCE ORIGINATION TASK ID	ISSUANCE ORIGINATION TASK PRIORITY
ORDER OF EVENTS	EVENT ATTRIBUTE (DISPATCH)	DISPATCH ORIGINATION TASK ID	DISPATCH ORIGINATION TASK PRIORITY	DISPATCH DESTINATION TASK ID
ORDER OF EVENTS	EVENT ATTRIBUTE (INTERRUPTION PROCESSING)	HANDLER ATTRIBUTE (CYCLE START HANDLER, ALARM HANDLER, INTERRUPTION HANDLER)	HANDLER NO.	—
⋮	⋮	⋮	⋮	⋮

TASK STATE AFTER ISSUING ISSUANCE ORIGINATION TASK	ISSUANCE DESTINATION TASK ID (ISSUANCE DESTINATION RESOURCE)	ISSUANCE DESTINATION TASK PRIORITY (ISSUANCE DESTINATION ID)	TASK STATE AFTER ISSUING ISSUANCE DESTINATION TASK
DISPATCH DESTINATION PRIORITY	—	—	—
⋮	⋮	⋮	⋮

EVENT ATTRIBUTE : ISSUANCE OF SYSTEM CALL
 DISPATCH INTERRUPTION PROCESSING
 HANDLER ATTRIBUTE : CYCLE START HANDLER
 ALARM HANDLER
 INTERRUPTION HANDLER

FIG.7

N	PRIOR EVENT	POSTERIOR EVENT	ITEM (TASK(y))
	⋮	⋮	⋮

TIMING (X)

FIG.8

(1)N	(2)REQUEST TASK	(3)STATE OF REQUEST TASK
⋮	⋮	⋮
⋮	⋮	⋮

FIG.9

(1)N	(2)TASK IN RUN STATE AT THE END OF EVENTS	(3)ext_tsk
⋮	⋮	⋮
⋮	⋮	⋮

FIG.10

(1)N	(2)ISSUANCE TARGET TO WHICH SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE IS ISSUED	(3)SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE
⋮	⋮	⋮
⋮	⋮	⋮

FIG. 11

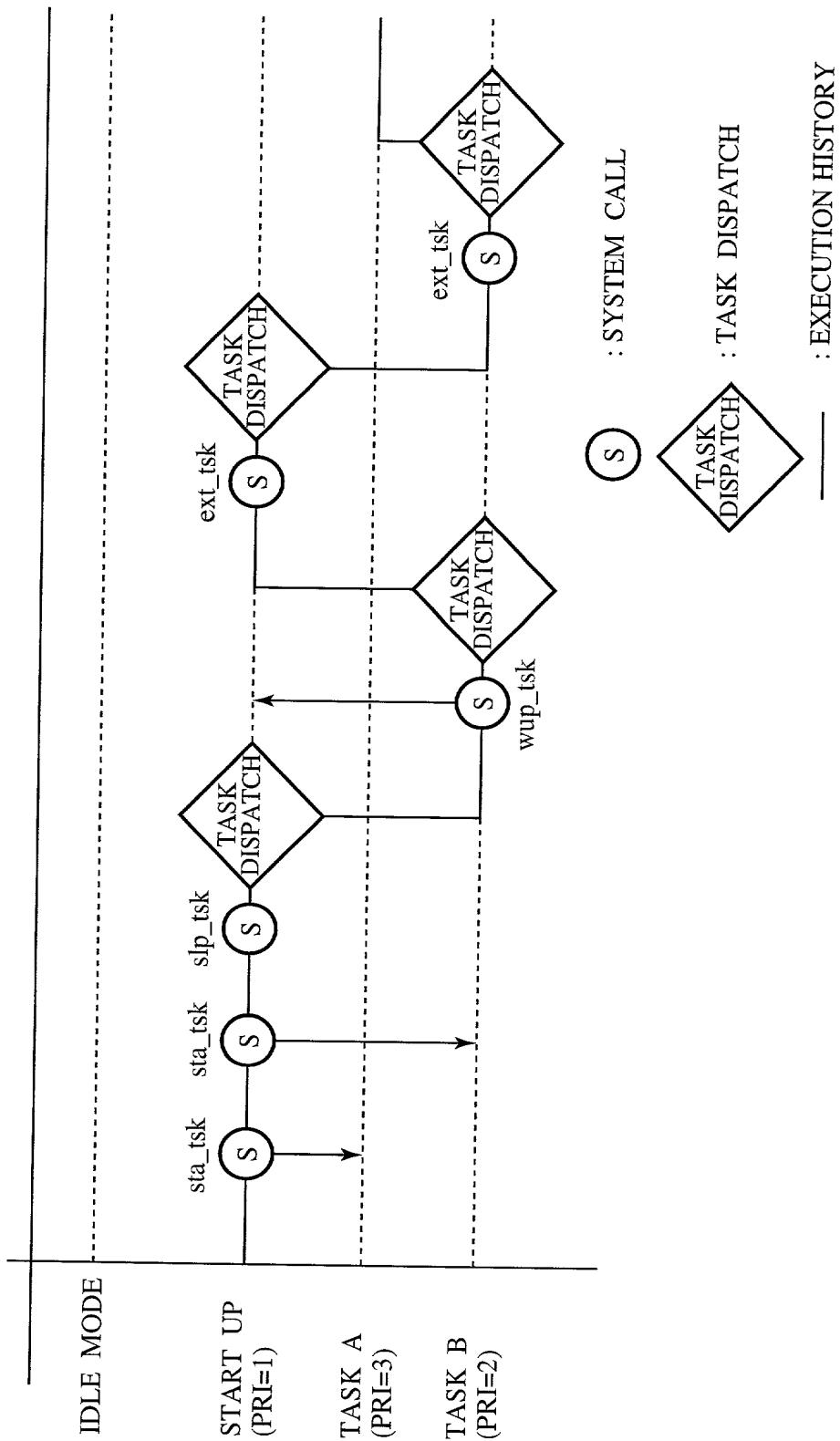


FIG.12

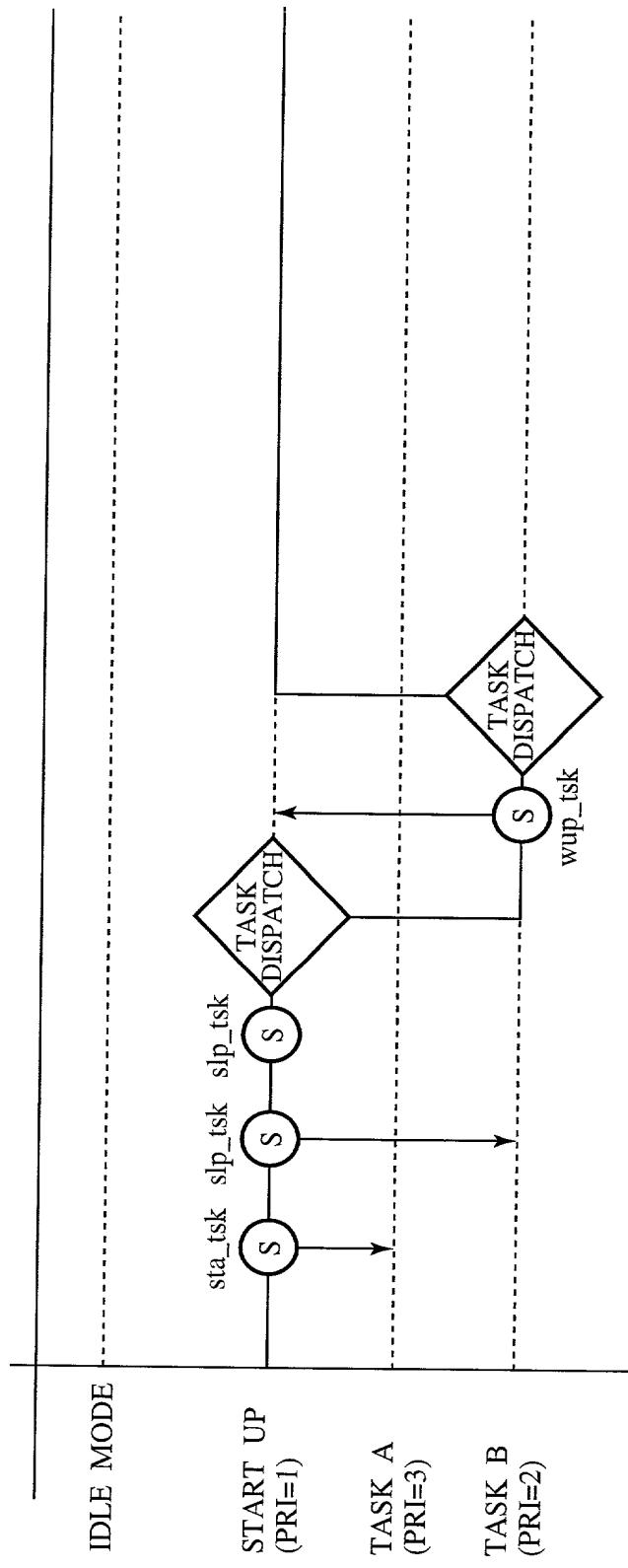


FIG.13

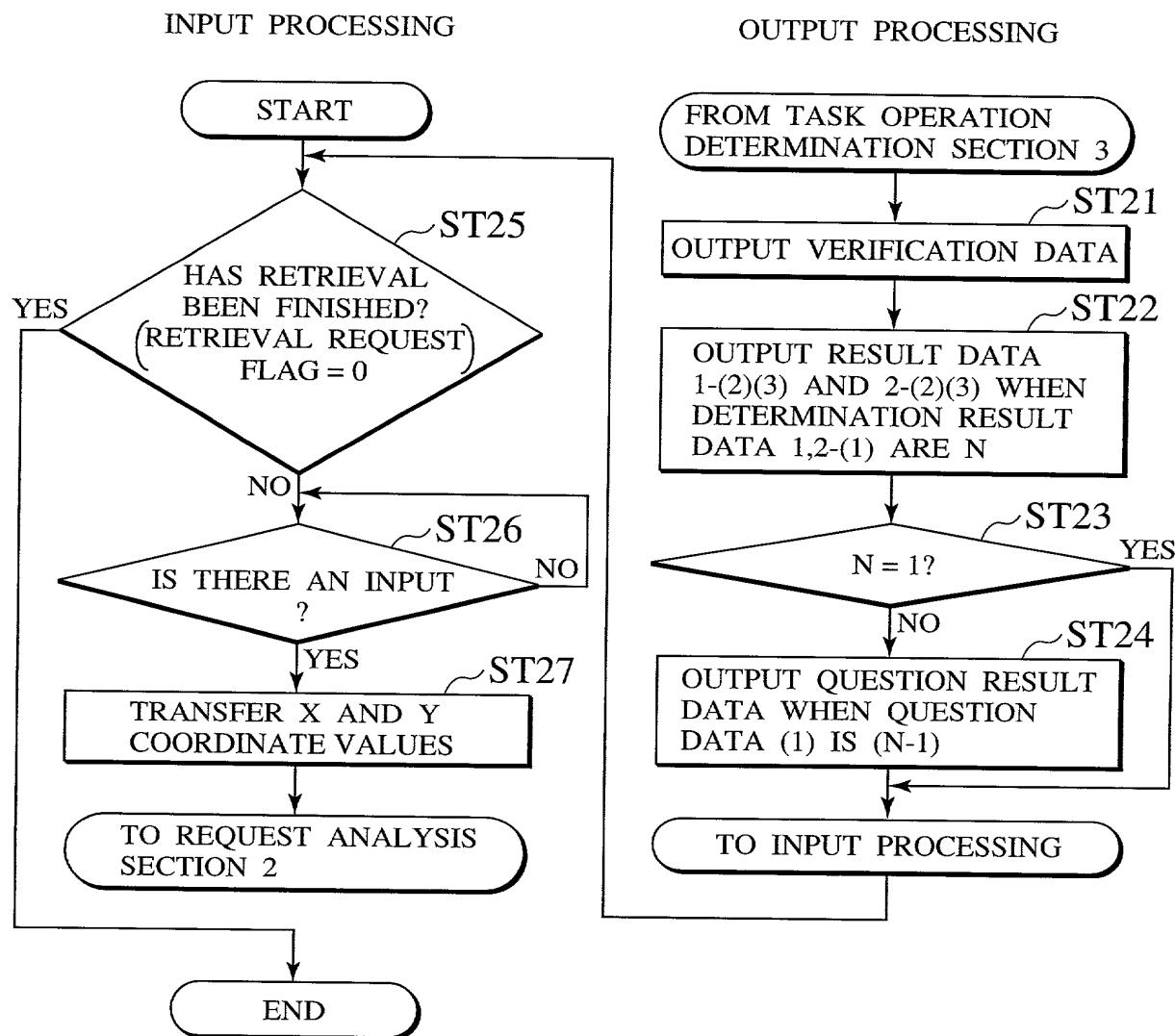


FIG.14

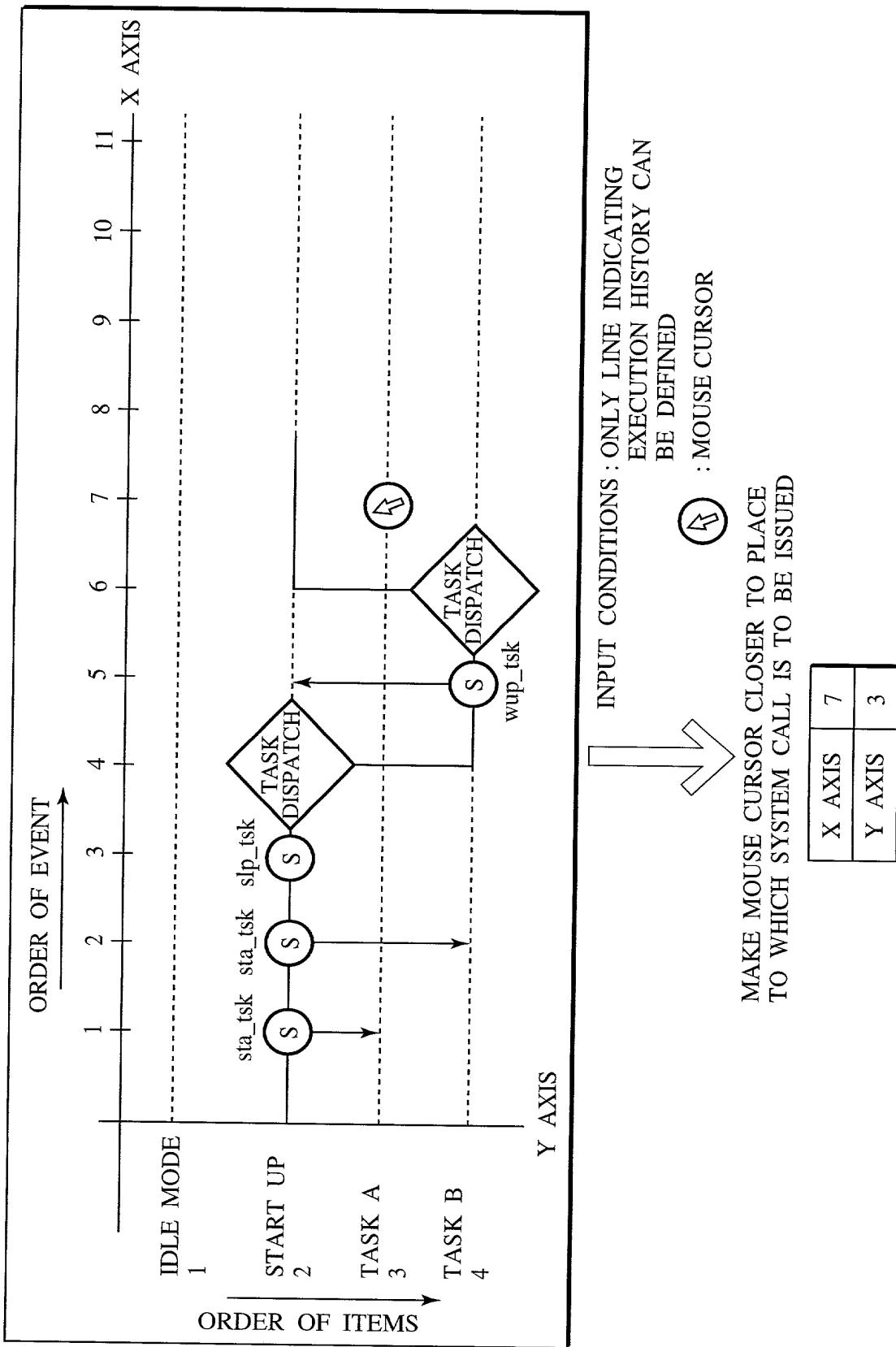


FIG.15

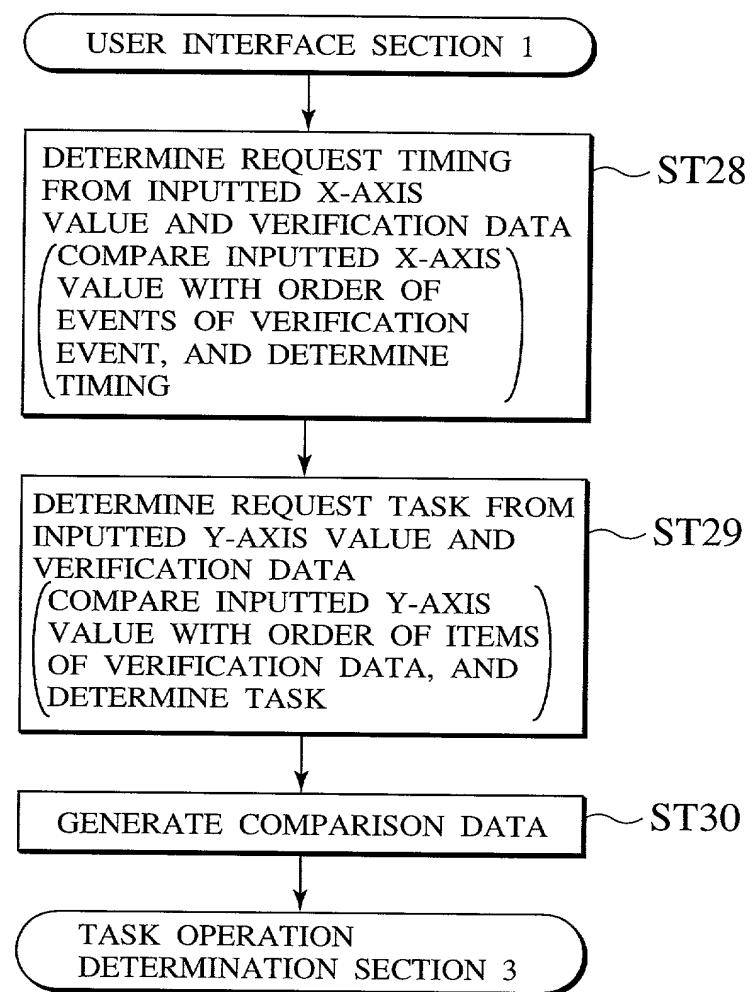


FIG. 16

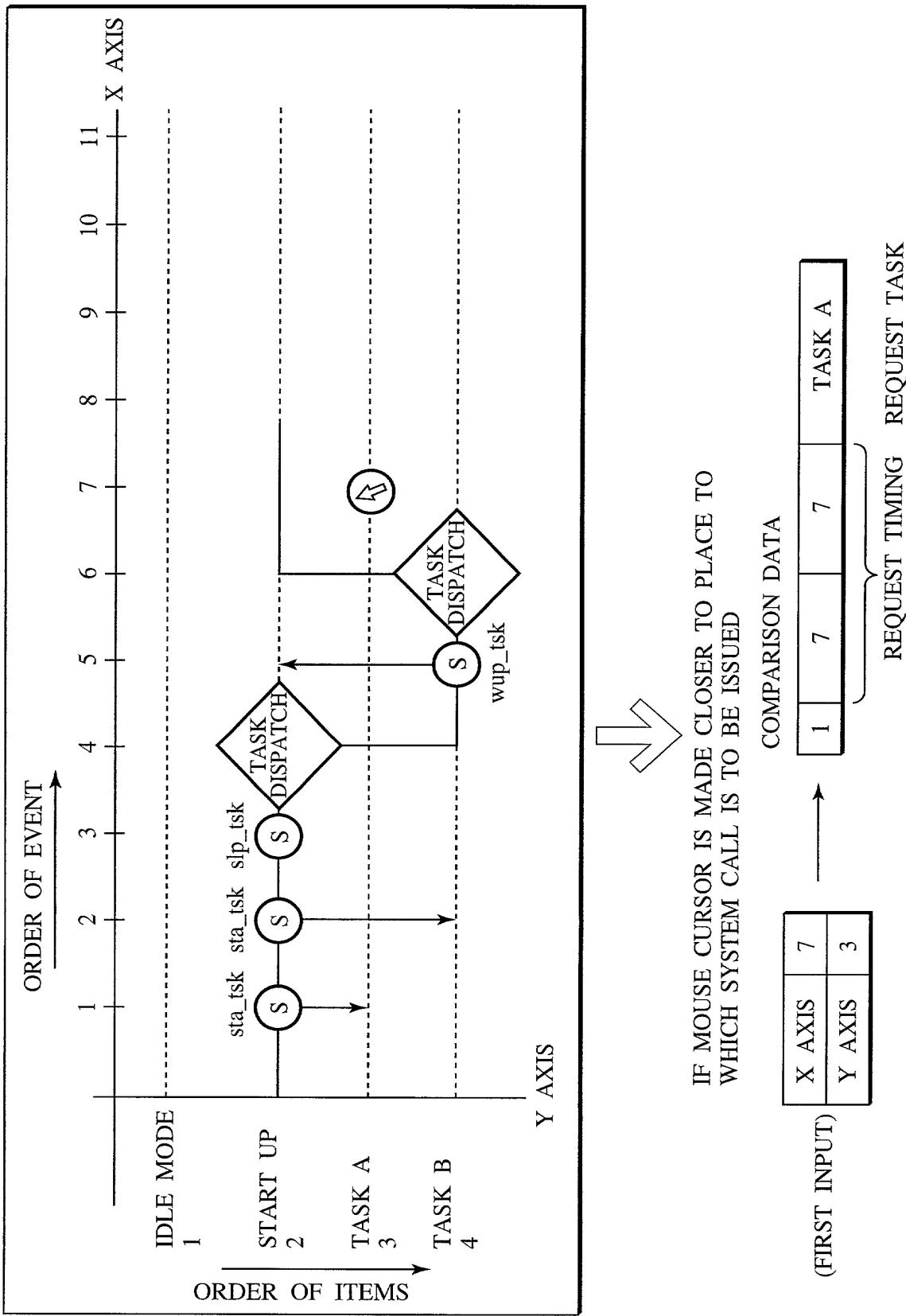


FIG. 17

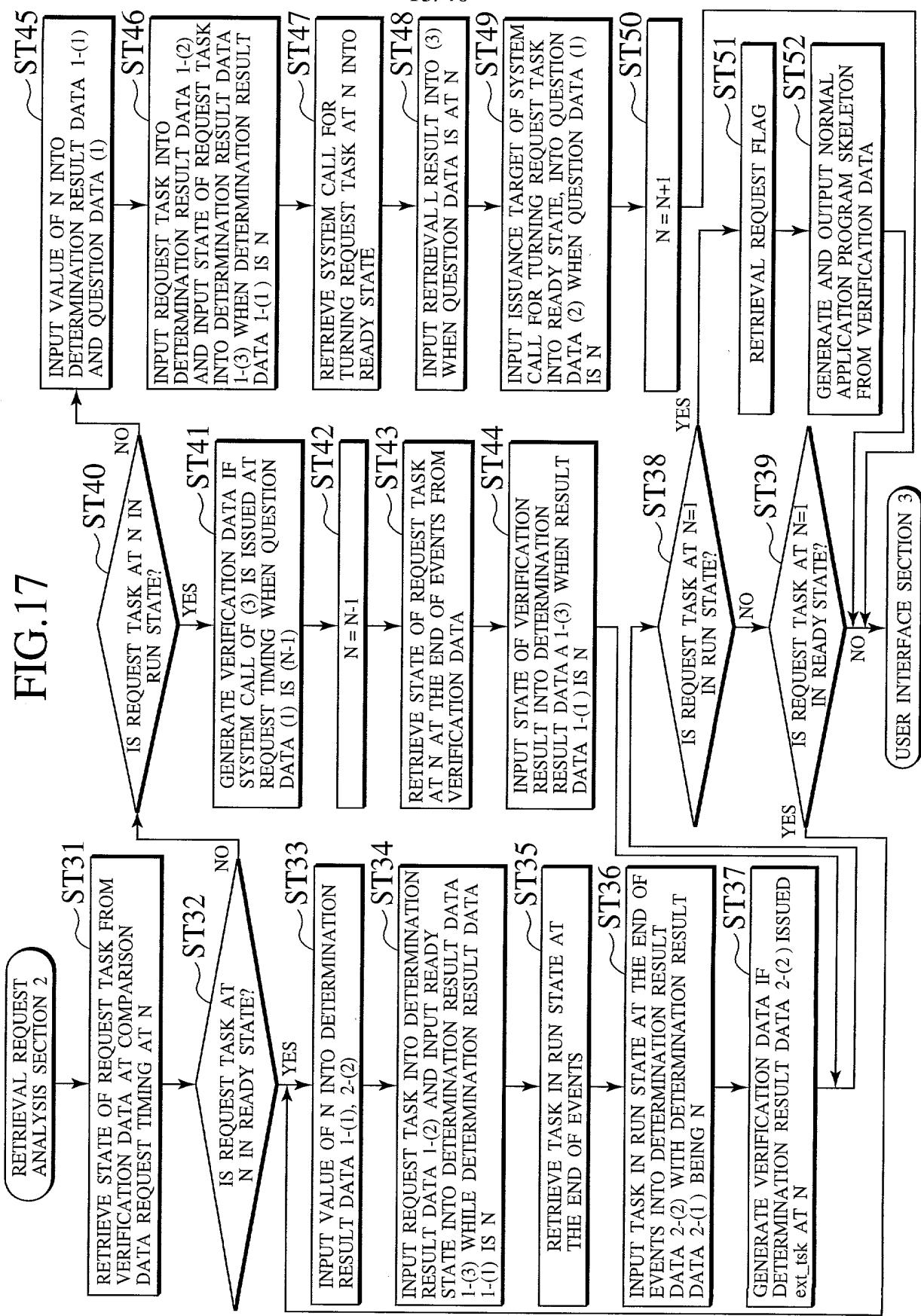


FIG.18

(SYSTEM CALL CORRESPONDENCE TABLE)

NO	SYSTEM CALL	CORRESPONDING SYSTEM CALL
1	sta_tsk	ext_tsk
2	slp_tsk	wup_tsk
3	wai_sem	sig_sem
...

FIG. 19
• PROCESSING [] → [FIRST REQUEST]
[VERIFICATION DATA]

COMPARISON DATA

	EVENT	EVENT	(TASK(y))
1	7	7	TASK A

DEFFECT SOLUTION QUESTION DATA

DEFECT SOLUTION QUESTION DATA			
(1)N	(2)ISSUANCE TARGET TO WHICH SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE IS ISSUED	(3)SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE	

⟨DETERMINATION RESULT DATA 2⟩

(1)N	(2)TASK IN RUN STATE AT THE END OF EVENTS	(3)ext_task

⟨DETERMINATION RESULT DATA 1⟩

● [PROCESSING 2] → [PROCESSING COMPLETED]
 〈VARIFICATION DATA〉

FIG.20

ORDER OF EVENTS	EVENT ATTRIBUTE	TASK STATE AFTER ISSUING ISSUANCE DESTINATION TASK									
		ISSUANCE DESTINATION TASK PRIORITY (ISSUANCE DESTINATION ID)			ISSUANCE DESTINATION TASK ID (ISSUANCE DESTINATION RESOURCE)			TASK STATE AFTER ISSUING ISSUANCE ORIGINATION TASK			
ISSUANCE ORIGINATION TASK PRIORITY										ISSUANCE ORIGINATION TASK ID	
		HANDLER NO.	HANDLER ATTRIBUTE	ISSUED SYSTEM CALL							
1	SYSTEM CALL	sta_tsk	—	—	START UP	1	RUNNING	TASK A	3	READY	
2	SYSTEM CALL	sta_tsk	—	—	START UP	1	RUNNING	TASK B	2	READY	
3	SYSTEM CALL	slp_tsk	—	—	START UP	1	WAITING	—	—	—	
4	TASK DISPATCH	—	—	—	START UP	1	—	TASK B	2	RUNNING	
5	SYSTEM CALL	wup_tsk	—	—	TASK B	2	RUNNING	START UP	1	READY	
6	TASK DISPATCH	—	—	—	TASK B	2	—	START UP	1	RUNNING	
7	SYSTEM CALL	ext_tsk	—	—	START UP	1	DORMANT	—	—	—	
8	TASK DISPATCH	—	—	—	START UP	1	—	TASK B	2	RUNNING	
9	SYSTEM CALL	ext_tsk	—	—	TASK B	2	DORMANT	—	—	—	
10	TASK DISPATCH	—	—	—	TASK B	2	—	TASK A	3	RUNNING	

〈COMPARISON DATA〉

N	PRIOR EVENT	POSTERIOR EVENT	ITEM (TASK(y))
1	7	7	TASK A

〈DEFECT SOLUTION QUESTION DATA〉

(1)N	(2)ISSUANCE TARGET TO WHICH SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE IS ISSUED	(3)SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE

〈DETERMINATION RESULT DATA 1〉

(1)N	(2)REQUEST TASK	(3)STATE OF REQUEST TASK
1	TASK A	READY
1	TASK A	READY

〈DETERMINATION RESULT DATA 2〉

(1)N	(2)TASK IN RUN STATE AT THE END OF EVENTS	(3)ext_tsk
1	START UP	ext_tsk
1	TASK B	ext_tsk

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★ ★

FIG.21

```
*****
File      : sample.c
Data      : 1999/11/11
Developer : TOSHIBA
Application Skeleton
*****  

#include "itron.h"  

#define TASK_ID1      1
#define TASK_ID2      2
#define TASK_ID3      3  

TASK startup() :  

TASK TaskA() :  

TASK TaskB() :  

TASK startup() :  

{  

    ER ercd ;  

    ercd = sta_tsk(TASK_ID2,0) ;  

    ercd = sta_tsk(TASK_ID3,0) ;  

    ercd = slp_tsk() ;  

    ext_tsk() ; ----- (a)  

}  

TASK TaskA()  

{  

    for( ; : ){  

    }  

}  

TASK TaskB()  

{  

    ER ercd ;  

    ercd = wup_tsk(TASK_ID1) ;  

    ext_tsk() ; ----- (b)  

}
```

FIG.22

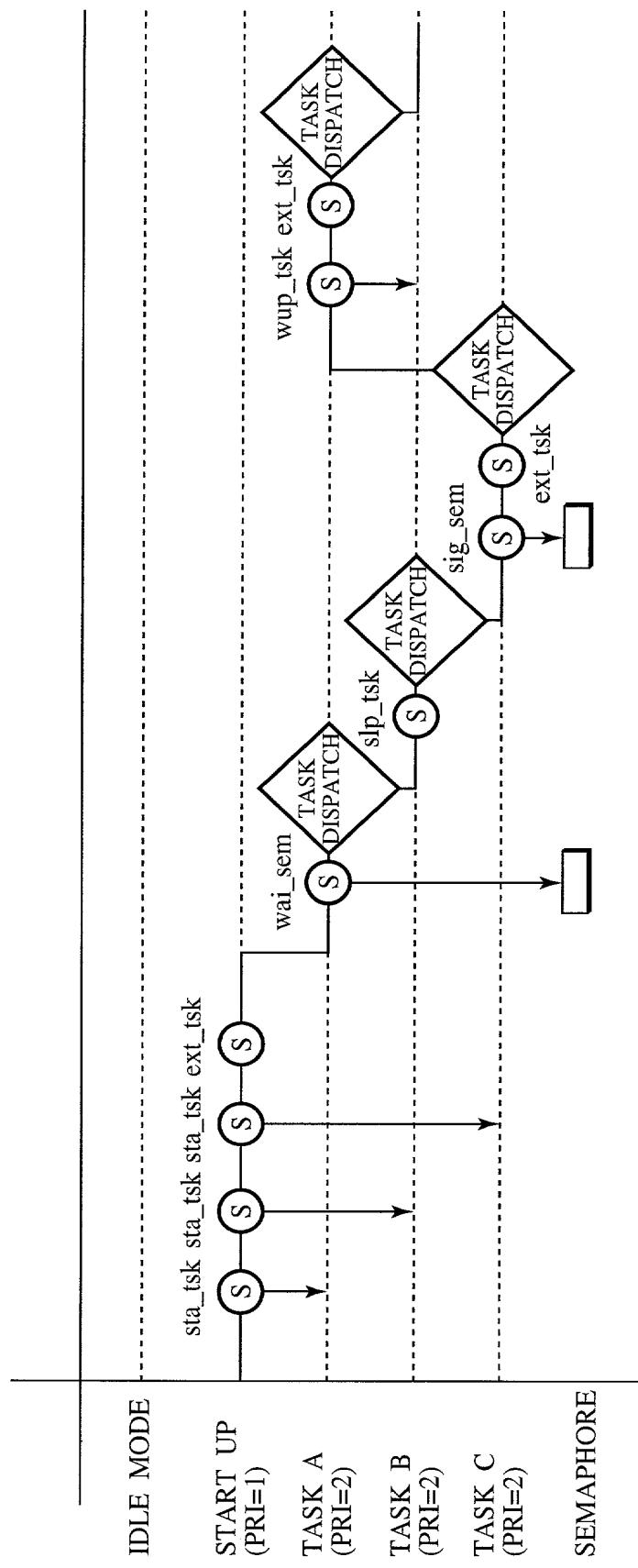


FIG.23

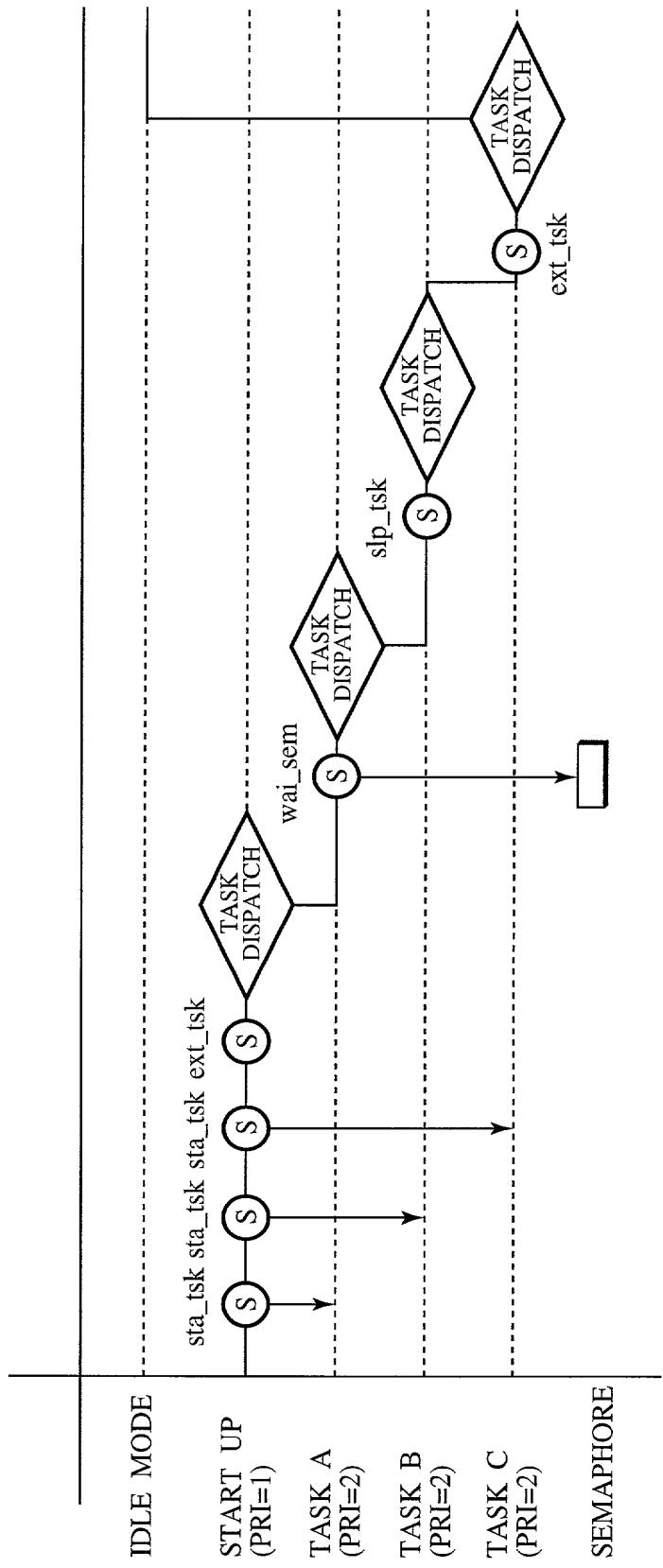


FIG. 24

● [PROCESSING 1] → [FIRST REQUEST]
⟨VERIFICATION DATA⟩

COMPARISON DATA

DEFFECT SOLUTION QUESTION DATA

DELETION QUESTION DATA	
(1)N	(2)ISSUANCE TARGET TO WHICH SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE IS ISSUED
	(3)SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE

⟨DETERMINATION RESULT DATA 1⟩

(1) IN	(2) REQUEST TASK	(3) STATE OF REQUEST TASK

DETERMINATION RESULT DATA 2

(1)N	(2)TASK IN RUN STATE AT THE END OF EVENTS	(3)ext_tsk

FIG. 25
(SPECIFICATION DATA)

COMPARISON DATA

N	PRIOR EVENT	POSTERIOR EVENT	ITEM (TASK(y))
1	12	12	TASK B
2	6	7	TASK A

〈DEFECT SOLUTION QUESTION DATA〉

(1)N	(2)ISSUANCE TARGET TO WHICH SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE IS ISSUED	(3)SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE	wup_tsk
1	TASK A		

⟨DETERMINATION RESULT DATA 1⟩

(1)N		(2)REQUEST TASK	(3)STATE OF REQUEST TASK
1		TASK B	WAITING

⟨DETERMINATION RESULT DATA 2⟩

(1)N	(2)TASK IN RUN STATE AT THE END OF EVENTS	(3)ext_tsk

FIG.26

●[PROCESSING 3]→[THIRD REQUEST]
⟨VARIIFICATION DATA⟩

ORDER OF EVENTS	EVENT ATTRIBUTE	HANDLER NO.	HANDLER ATTRIBUTE	ISSUED SYSTEM CALL	TASK STATE AFTER ISSUING ISSUANCE ORIGINATION TASK		ISSUANCE ORIGINATION TASK PRIORITY (ISSUANCE DESTINATION RESOURCE)	ISSUANCE DESTINATION TASK ID (ISSUANCE DESTINATION ID)	TASK STATE AFTER ISSUING ISSUANCE DESTINATION TASK	ISSUANCE DESTINATION TASK PRIORITY (ISSUANCE DESTINATION ID)	TASK STATE AFTER ISSUING ISSUANCE DESTINATION TASK
					ITEM (TASK(y))	ITEM (TASK(y))					
1	SYSTEM CALL	sta_tsk	—	—	START UP	1	RUNNING	TASK A	2	READY	READY
2	SYSTEM CALL	sta_tsk	—	—	START UP	1	RUNNING	TASK B	2	READY	READY
3	SYSTEM CALL	sta_tsk	—	—	START UP	1	RUNNING	TASK C	2	READY	READY
4	SYSTEM CALL	ext_tsk	—	—	START UP	1	DORMANT	—	—	—	—
5	TASK DISPATCH	—	—	—	START UP	1	—	TASK A	2	RUNNING	RUNNING
6	SYSTEM CALL	wai_sem	—	—	TASK A	2	WAITING	SEMAPHORE	1	—	—
7	TASK DISPATCH	—	—	—	TASK A	2	—	TASK B	2	RUNNING	RUNNING
8	SYSTEM CALL	slp_tsk	—	—	TASK B	2	WAITING	—	—	—	—
9	TASK DISPATCH	—	—	—	TASK B	2	—	TASK C	—	RUNNING	RUNNING
10	SYSTEM CALL	ext_tsk	—	—	TASK C	2	DORMANT	—	—	—	—
11	TASK DISPATCH	—	—	—	TASK C	2	—	IDLE MODE	—	—	—

⟨COMPARISON DATA⟩

N	PRIOR	POSTERIOR	ITEM (TASK(y))	(2)ISSUANCE TARGET TO WHICH SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE IS ISSUED	(3)SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE
1	12	12	TASK B	1	task A
2	6	7	TASK A	1	wup_tsk
3	9	10	TASK C	2	sig_sem

⟨DETERMINATION RESULT DATA 1⟩

(1)N	(2)REQUEST TASK	(3)STATE OF REQUEST TASK	(2)TASK IN RUN STATE AT THE END OF EVENTS	(3)ext_tsk
1	TASK B	WAITING		
2	TASK A	WAITING		

⟨DETERMINATION RESULT DATA 2⟩

(1)N	(2)SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE	(3)SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE
1	task A	task C
2	task C	task A

★

$\langle A \rangle$

FIG. 27

ORDER OF EVENTS	EVENT ATTRIBUTE	ISSUED SYSTEM CALL	HANDLER ATTRIBUTE	HANDLER NO.	ISSUANCE ORIGINATION TASK ID	ISSUANCE ORIGINATION TASK PRIORITY	TASK STATE AFTER ISSUING ISSUANCE ORIGINATION TASK	ISSUANCE DESTINATION TASK ID (ISSUANCE DESTINATION RESOURCE)	ISSUANCE DESTINATION TASK PRIORITY (ISSUANCE DESTINATION ID)	TASK STATE AFTER ISSUING ISSUANCE DESTINATION TASK	
1	SYSTEM CALL	sta_tsks	—	—	START UP	1	RUNNING	TASK A	2	READY	
2	SYSTEM CALL	sta_tsks	—	—	START UP	1	RUNNING	TASK B	2	READY	
3	SYSTEM CALL	sta_tsks	—	—	START UP	1	RUNNING	TASK C	2	READY	
4	SYSTEM CALL	ext_tsks	—	—	START UP	1	DORMANT	—	—	—	
5	TASK DISPATCH	—	—	—	START UP	1	—	TASK A	2	RUNNING	
6	SYSTEM CALL	wai_sem	—	—	TASK A	2	WAITING	SEMAPHORE	1	—	
7	TASK DISPATCH	—	—	—	TASK A	2	—	TASK B	2	RUNNING	
8	SYSTEM CALL	slp_tsks	—	—	TASK B	2	WAITING	—	—	—	
9	TASK DISPATCH	—	—	—	TASK B	2	—	TASK C	2	RUNNING	
10	SYSTEM CALL	sig_sem	—	—	TASK C	2	RUNNING	SEMAPHORE	1	—	
11	SYSTEM CALL	ext_tsks	—	—	TASK C	2	DORMANT	—	—	—	
12	TASK DISPATCH	—	—	—	TASK C	2	—	TASK A	2	RUNNING	

⟨COMPARISON DATA⟩

DEFECT SOLUTION QUESTION DATA

DECISION POINT: EMISSION		DECISION POINT: EMISSION	
(1) N	(2) ISSUANCE TARGET TO WHICH SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE IS ISSUED	(3) SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE	wup_isk
1	TASK A		sig_sem
2	TASK C		

⟨DETERMINATION RESULT DATA 2⟩

(1)N	(2)REQUEST TASK	(3)STATE OF REQUEST TASK	(1)N	(2)TASK IN RUN STATE AT THE END OF EVENTS	(3)ext_task
1	TASK B	WAITING			
2	TASK A	RUNNING			

FIG.28

●[PROCESSING 5]→[FIFTH REQUEST]
(VARIFICATION DATA)

ORDER OF EVENTS	EVENT ATTRIBUTE	ISSUANCE ORIGINATION TASK ID	ISSUANCE ORIGINATION TASK PRIORITY	TASK STATE AFTER ISSUING ISSUANCE ORIGINATION TASK	ISSUANCE DESTINATION TASK ID (ISSUANCE DESTINATION RESOURCE)	ISSUANCE DESTINATION TASK PRIORITY (ISSUANCE DESTINATION ID)	TASK STATE AFTER ISSUING ISSUANCE DESTINATION TASK
1	SYSTEM CALL	sta_tsk	—	START UP 1	RUNNING	TASK A	READY 2
2	SYSTEM CALL	sta_tsk	—	START UP 1	RUNNING	TASK B	READY 2
3	SYSTEM CALL	sta_tsk	—	START UP 1	RUNNING	TASK C	READY 2
4	SYSTEM CALL	ext_tsk	—	START UP 1	DORMANT	—	—
5	TASK DISPATCH	—	—	START UP 1	—	TASK A	2 RUNNING
6	SYSTEM CALL	wai_sem	—	TASK A 2	WAITING	SEMAPHORE	1 —
7	TASK DISPATCH	—	—	TASK A 2	—	TASK B	2 RUNNING
8	SYSTEM CALL	slp_tsk	—	TASK B 2	WAITING	—	—
9	TASK DISPATCH	—	—	TASK B 2	—	TASK C	2 RUNNING
10	SYSTEM CALL	sig_sem	—	TASK C 2	RUNNING	SEMAPHORE	1 —
11	SYSTEM CALL	ext_tsk	—	TASK C 2	DORMANT	—	—
12	TASK DISPATCH	—	—	TASK C 2	—	TASK A	2 RUNNING
13	SYSTEM CALL	wup_tsk	—	TASK A 2	RUNNING	TASK B	2 READY
14	SYSTEM CALL	ext_tsk	—	TASK A 2	DORMANT	—	—
15	TASK DISPATCH	—	—	TASK A 2	—	TASK B	2 RUNNING

(COMPARISON DATA)

N	PRIOR EVENT	POSTERIOR EVENT	ITEM (TASK(y))
1	12	12	TASK B
2	6	7	TASK A
3	9	10	TASK C
1	13	13	TASK B
2	11	12	TASK A

(DETECT SOLUTION QUESTION DATA)

(1)N	(2)ISSUANCE TARGET TO WHICH SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE IS ISSUED	(3)SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE
1	TASK A	2
2	TASK C	wup_tsk

(DETERMINATION RESULT DATA 1)

(1)N	(2)REQUEST TASK	(3)STATE OF REQUEST TASK
1	TASK B	RUNNING
2	TASK A	RUNNING

(DETERMINATION RESULT DATA 2)

(1)N	(2)TASK IN RUN STATE AT THE END OF EVENTS	(3)ext_tsk
1	TASK A	ext_tsk
2		

●[PROCESSING 6]→[PROCESSING COMPLETED]
(VERIFICATION DATA)

FIG.29

ORDER OF EVENTS	EVENT ATTRIBUTE	TASK STATE AFTER ISSUING ISSUANCE DESTINATION TASK		
		ISSUANCE DESTINATION TASK PRIORITY (ISSUANCE DESTINATION ID)	ISSUANCE DESTINATION TASK ID (ISSUANCE DESTINATION RESOURCE)	ISSUANCE ORIGINATION TASK PRIORITY
1	SYSTEM CALL	sta_tsk	—	START UP
2	SYSTEM CALL	sta_tsk	—	START UP
3	SYSTEM CALL	sta_tsk	—	START UP
4	SYSTEM CALL	ext_lsk	—	START UP
5	TASK DISPATCH	—	—	START UP
6	SYSTEM CALL	wai_sem	—	TASK A
7	TASK DISPATCH	—	—	TASK A
8	SYSTEM CALL	slp_tsk	—	TASK B
9	TASK DISPATCH	—	—	TASK B
10	SYSTEM CALL	sig_sem	—	TASK C
11	SYSTEM CALL	ext_tsk	—	TASK C
12	TASK DISPATCH	—	—	TASK C
13	SYSTEM CALL	wup_tsk	—	TASK A
14	SYSTEM CALL	ext_tsk	—	TASK A
15	TASK DISPATCH	—	—	TASK A

(COMPARISON DATA)

N	PRIOR EVENT	POSTERIOR EVENT	ITEM (TASK(y))
1	12	12	TASK B
2	6	7	TASK A
3	9	10	TASK C
1	13	13	TASK B
2	6	7	TASK A

(DETERMINATION RESULT DATA 1)

(1)N	(2)REQUEST TASK	(3)STATE OF REQUEST TASK
1	TASK B	READY
2	TASK A	RUNNING

(DETECT SOLUTION QUESTION DATA)

(2)ISSUANCE TARGET TO WHICH SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE IS ISSUED		(3)SYSTEM CALL FOR TURNING REQUEST TASK IN READY STATE
(1)N	—	—
1	TASK A	—
2	TASK C	—
		wup_tsk
		sig_sem

(DETERMINATION RESULT DATA 2)

(1)N	(2)TASK IN RUN STATE AT THE END OF EVENTS	(3)ext_tsk
1	TASK A	ext_tsk
2		

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FIG.30

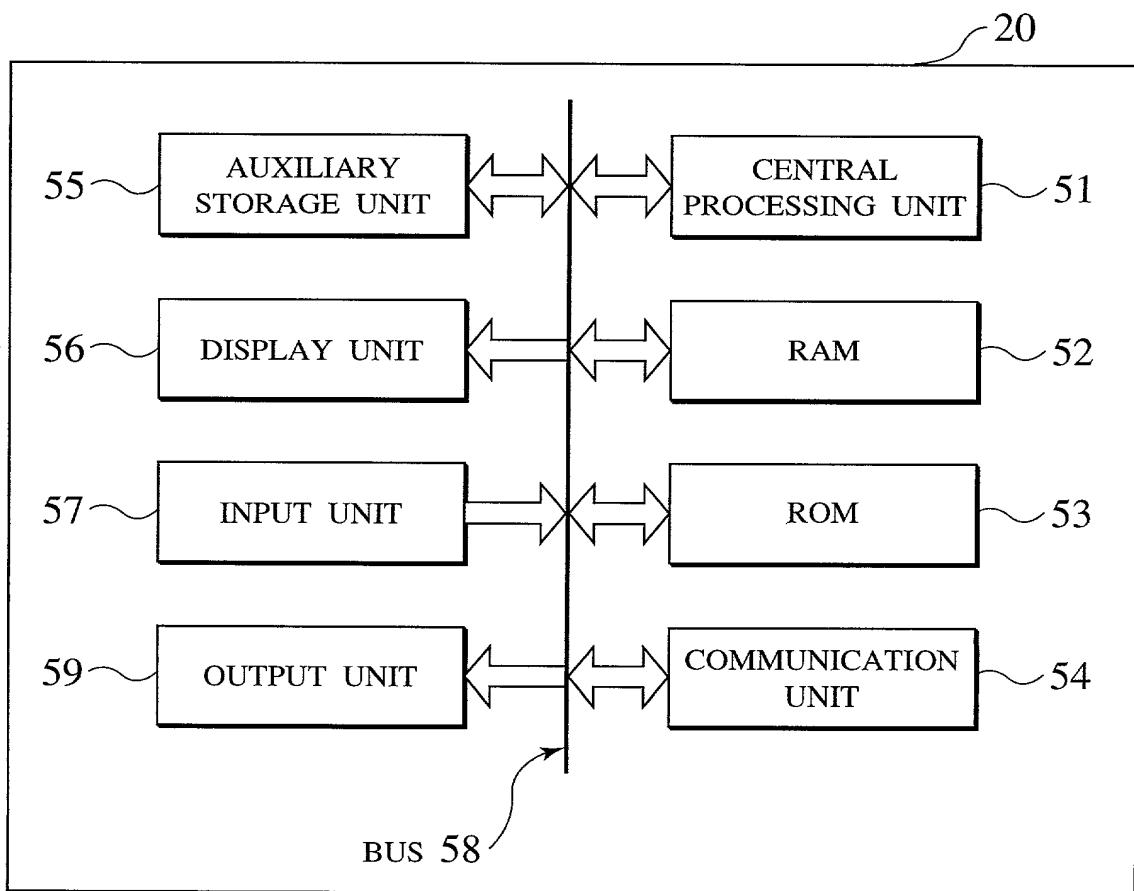


FIG. 31

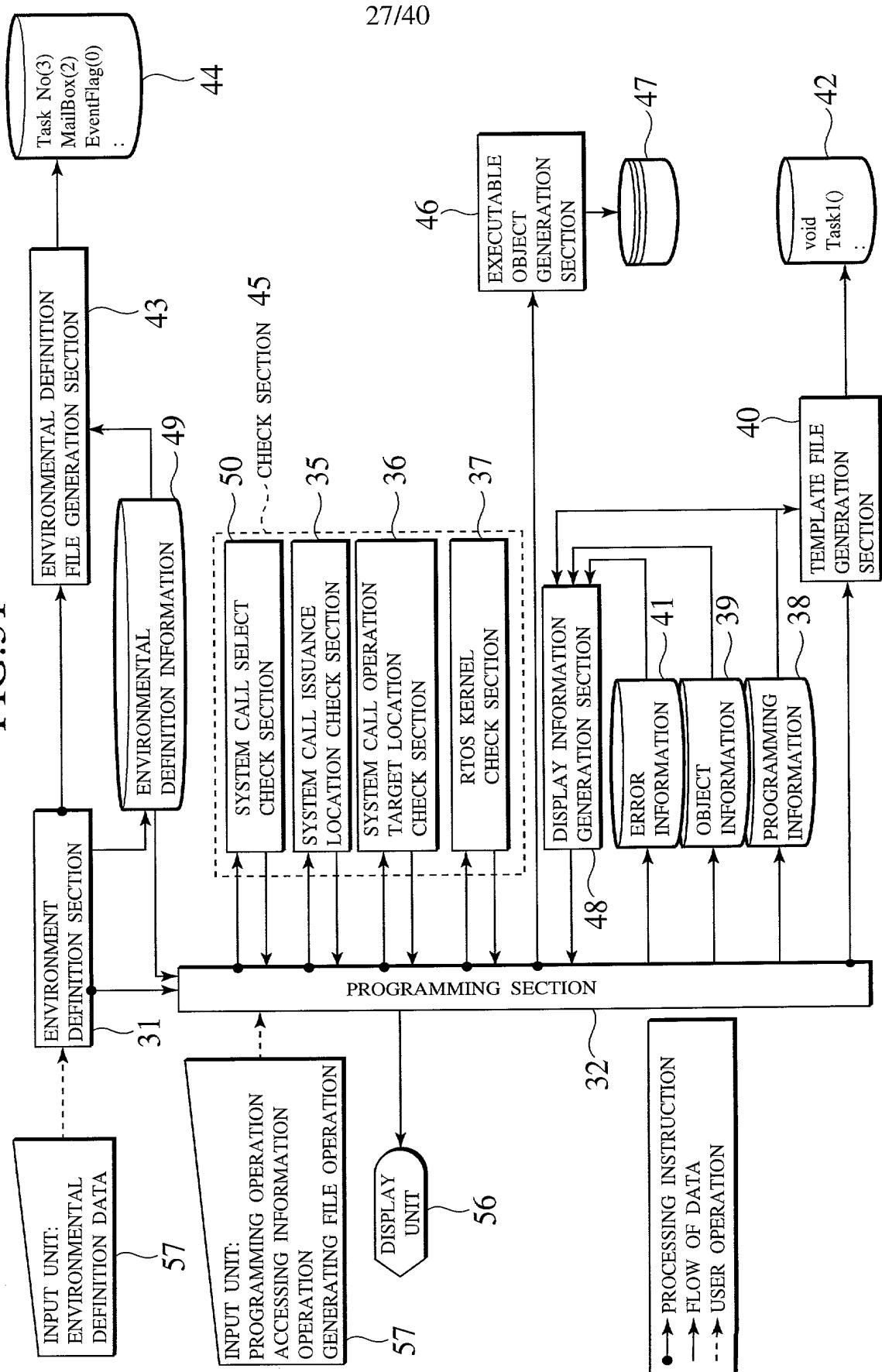


FIG.32

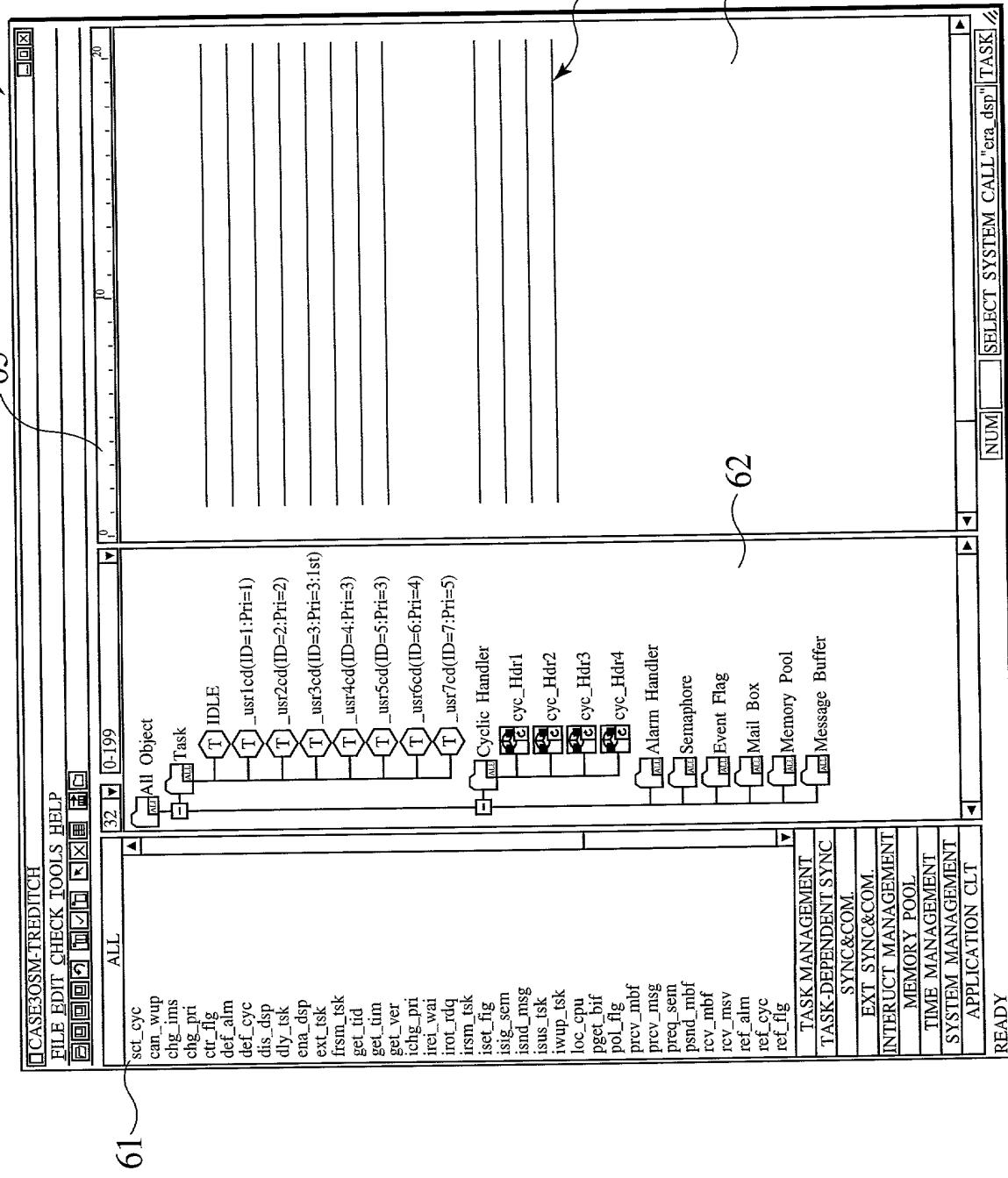


FIG.33

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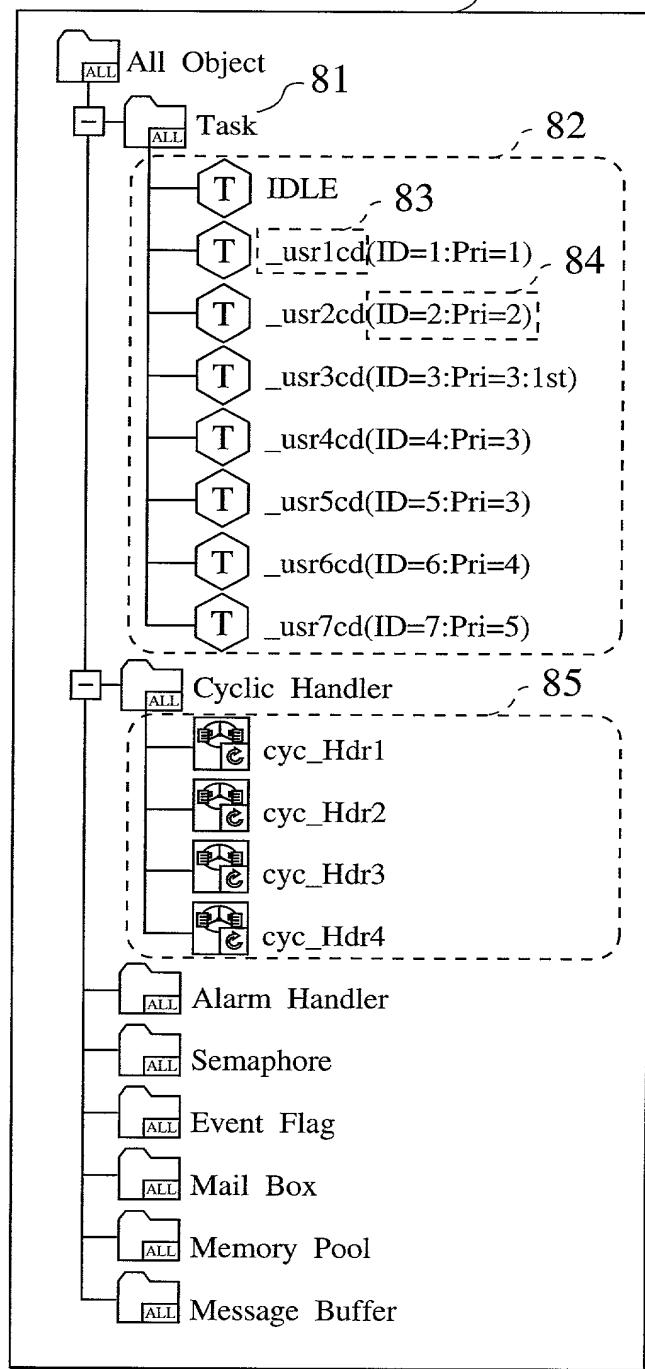
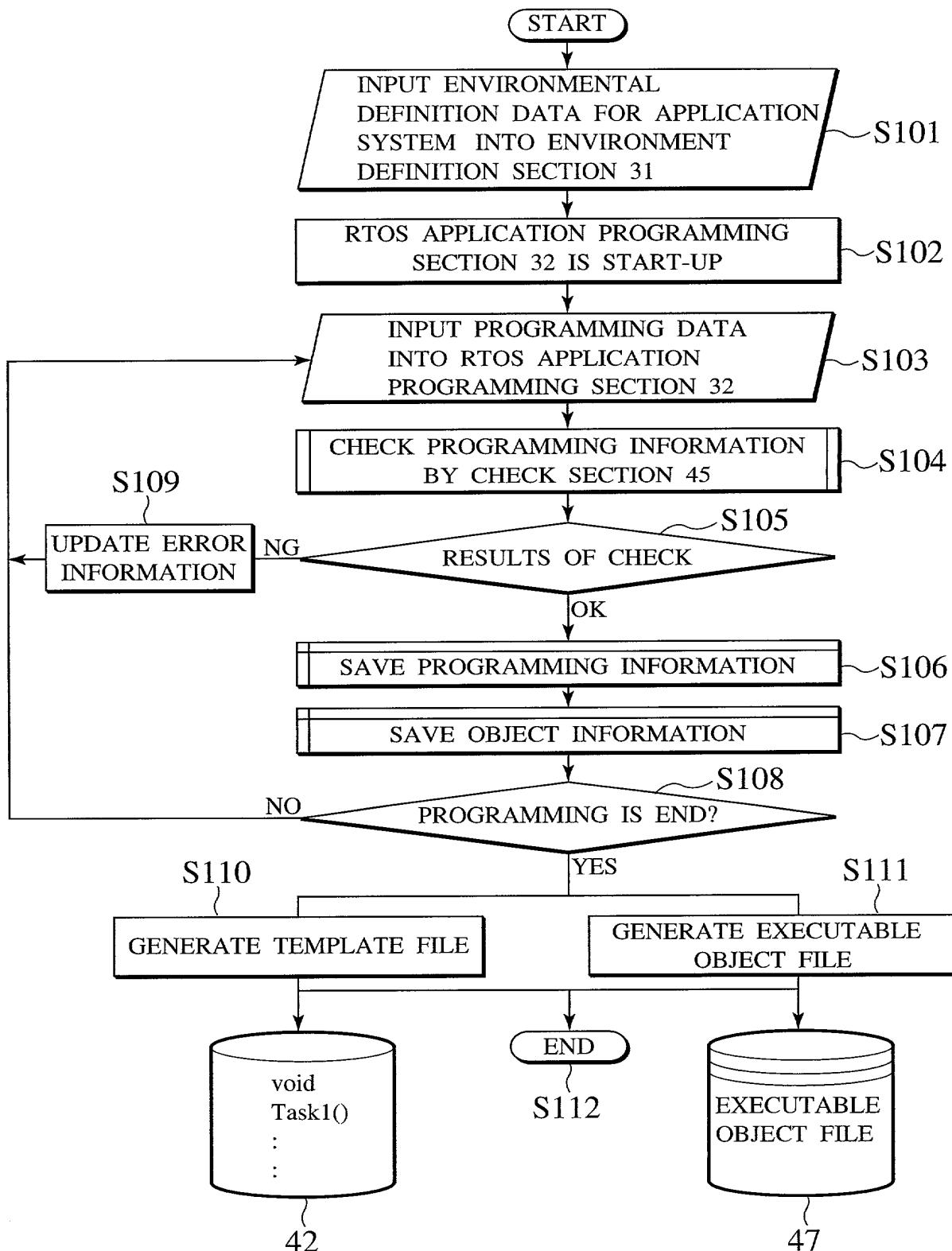


FIG.34



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FIG.35

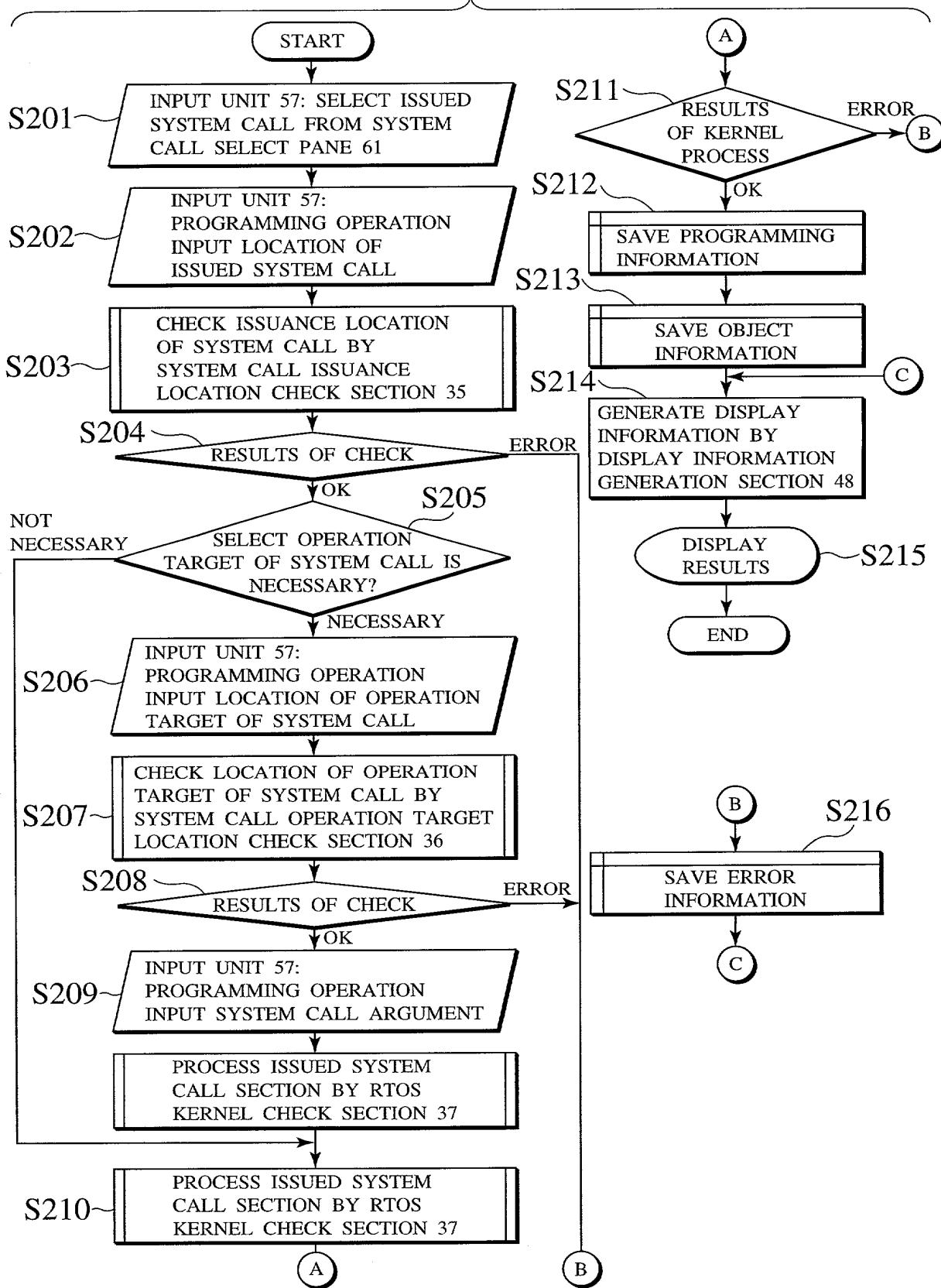


FIG.36

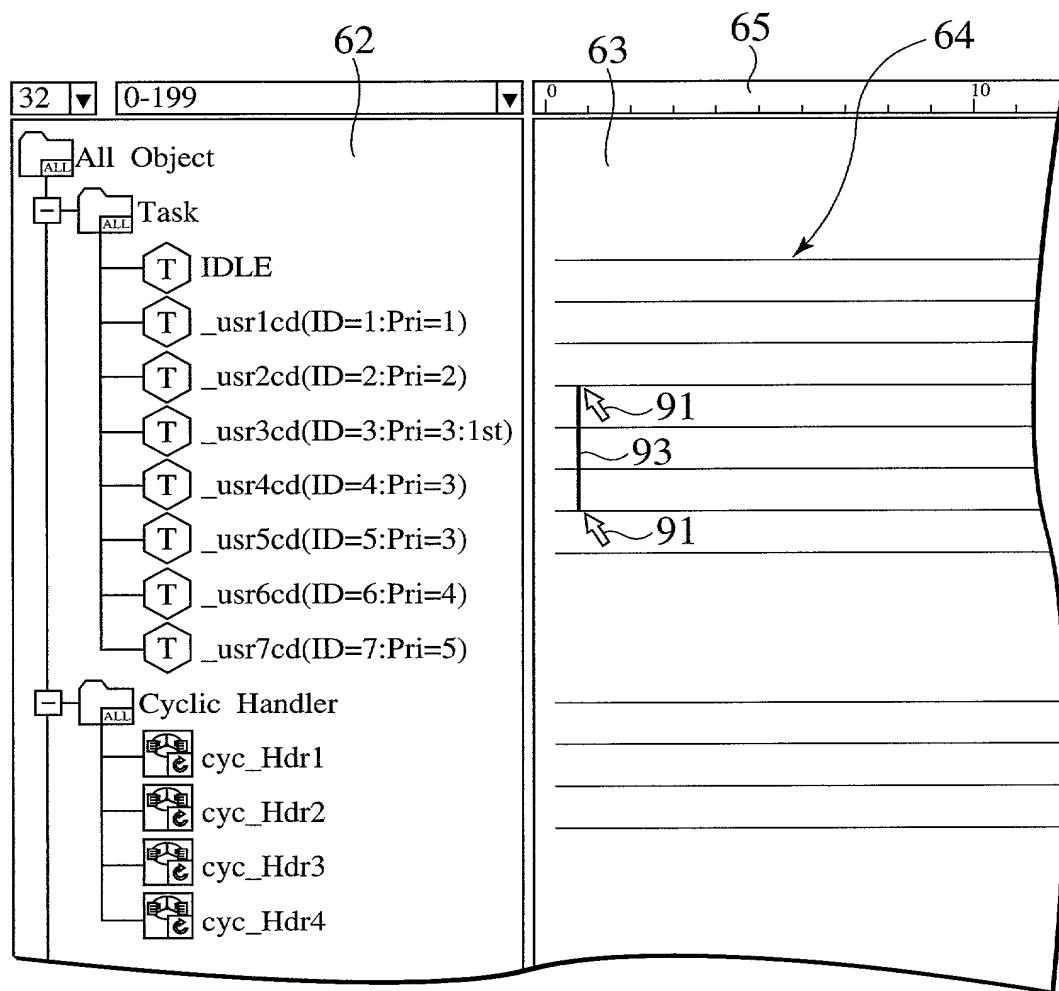


FIG.37

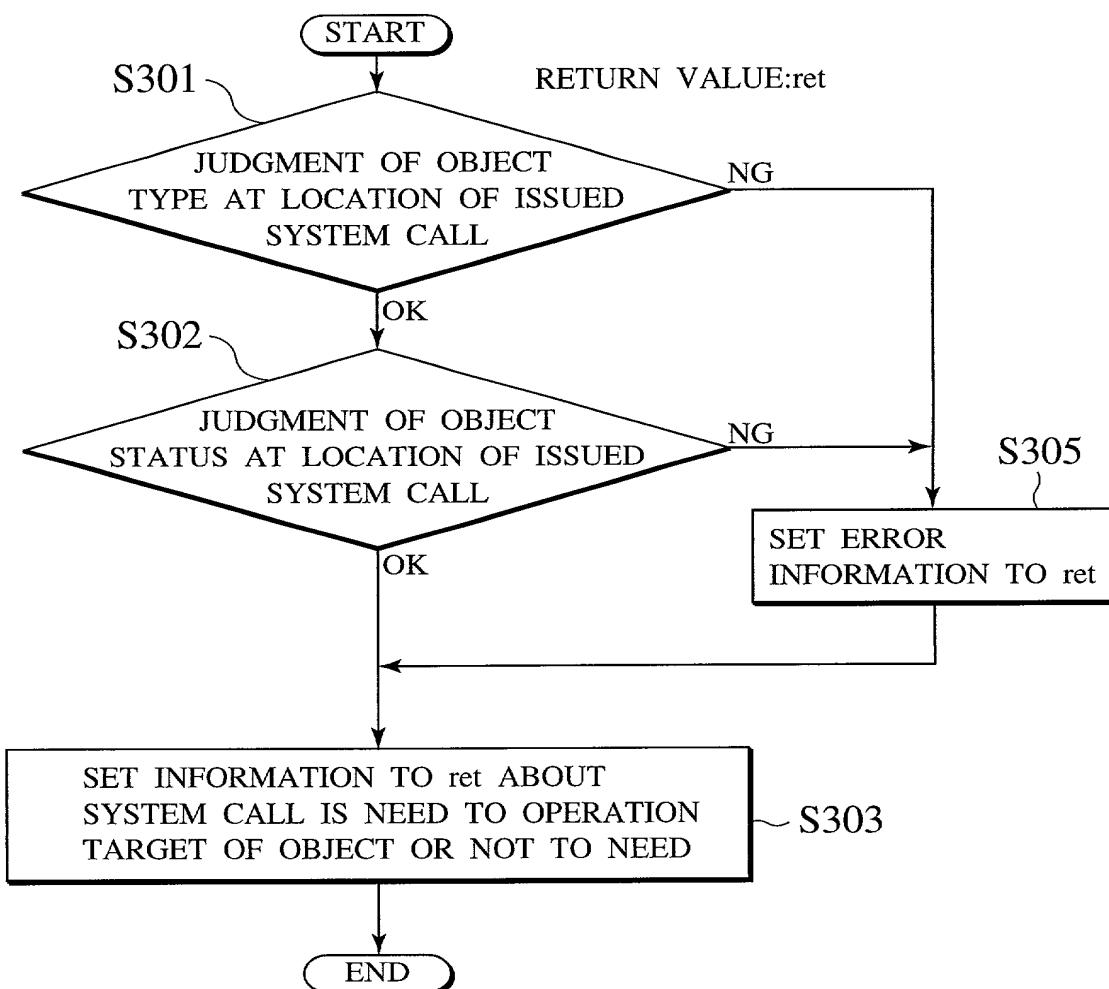


FIG.38

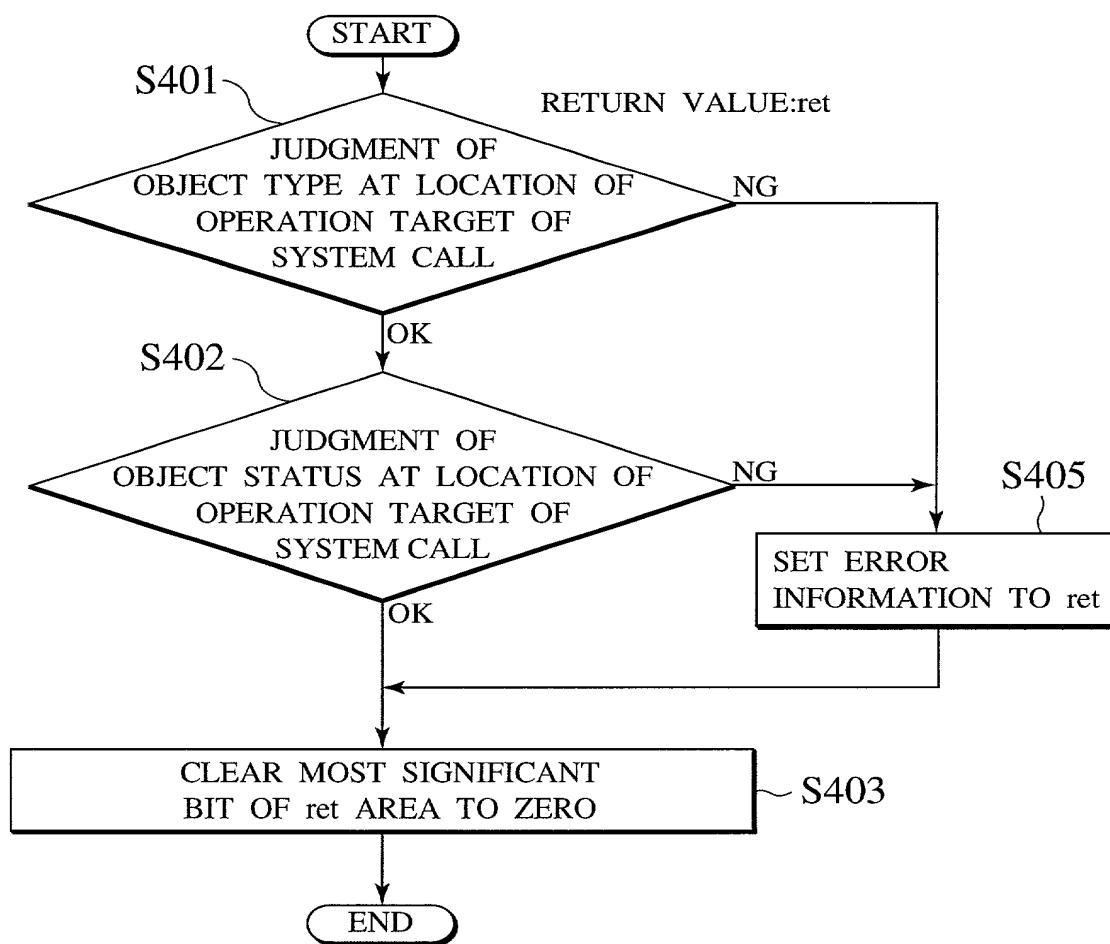


FIG.39

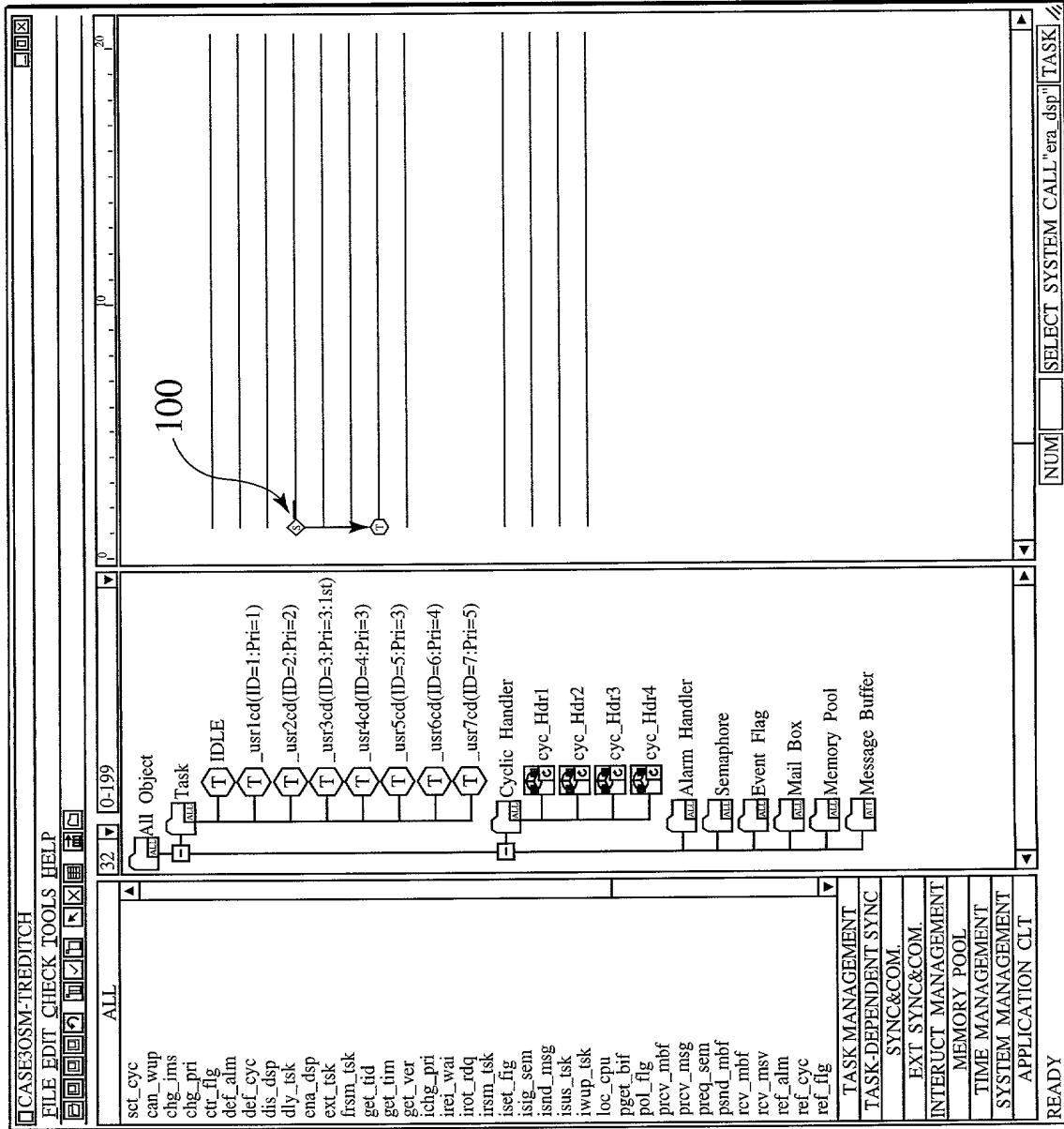


FIG.40

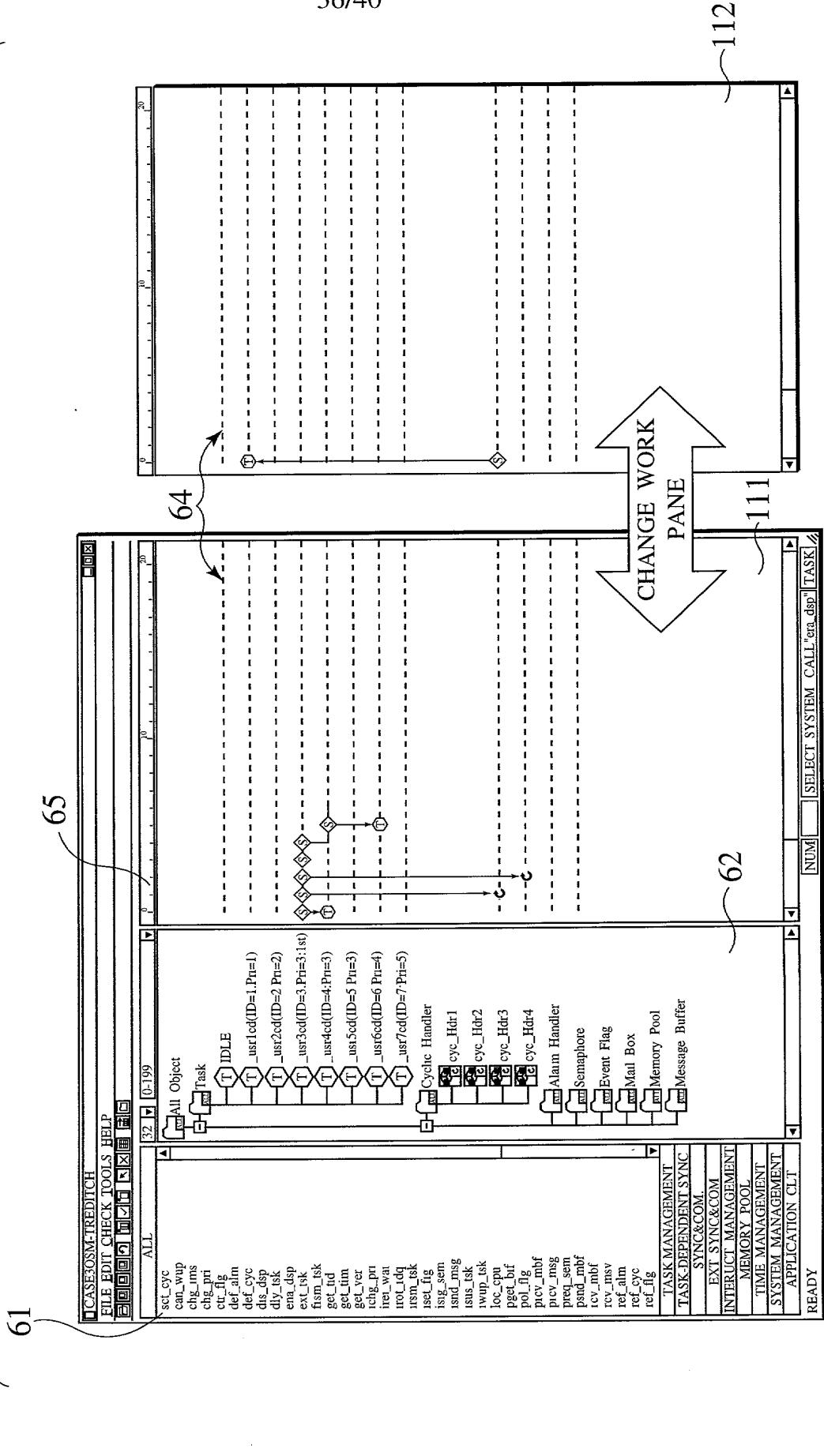


FIG.41

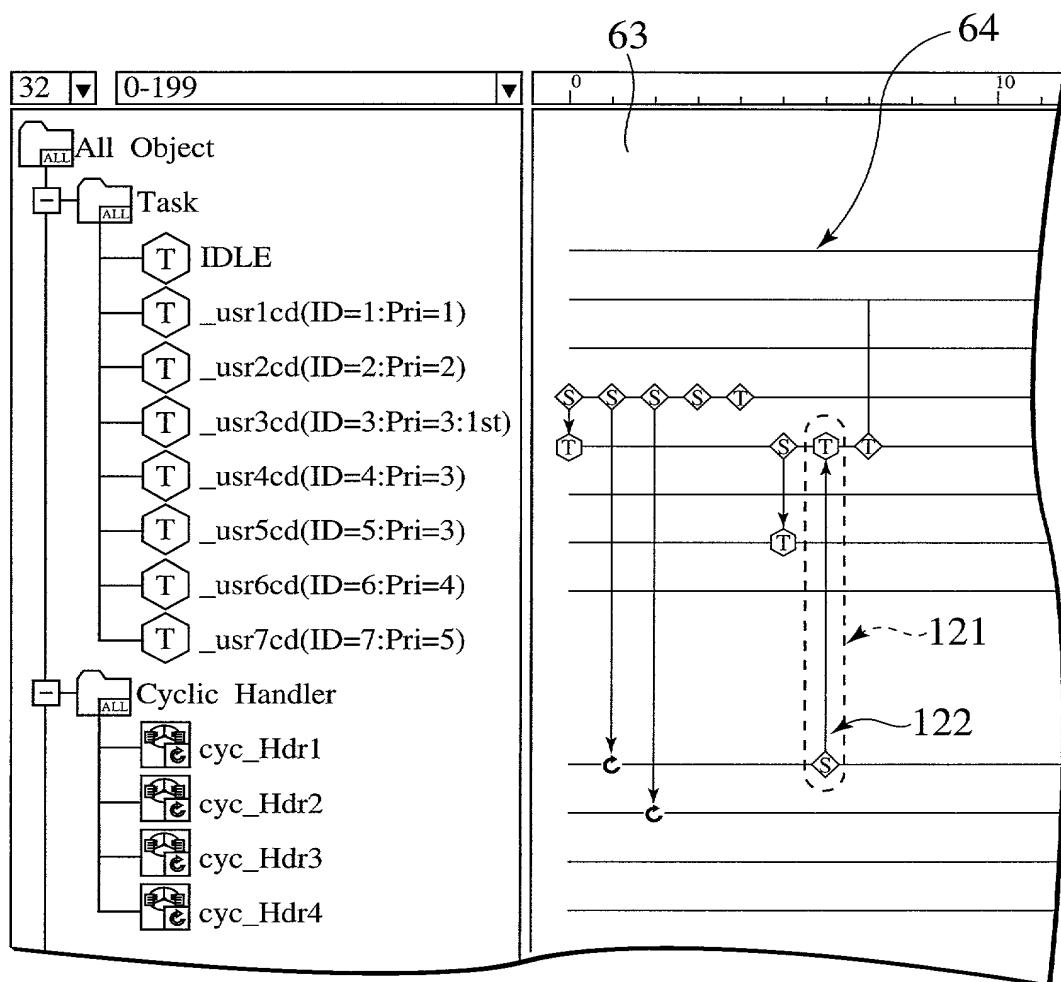
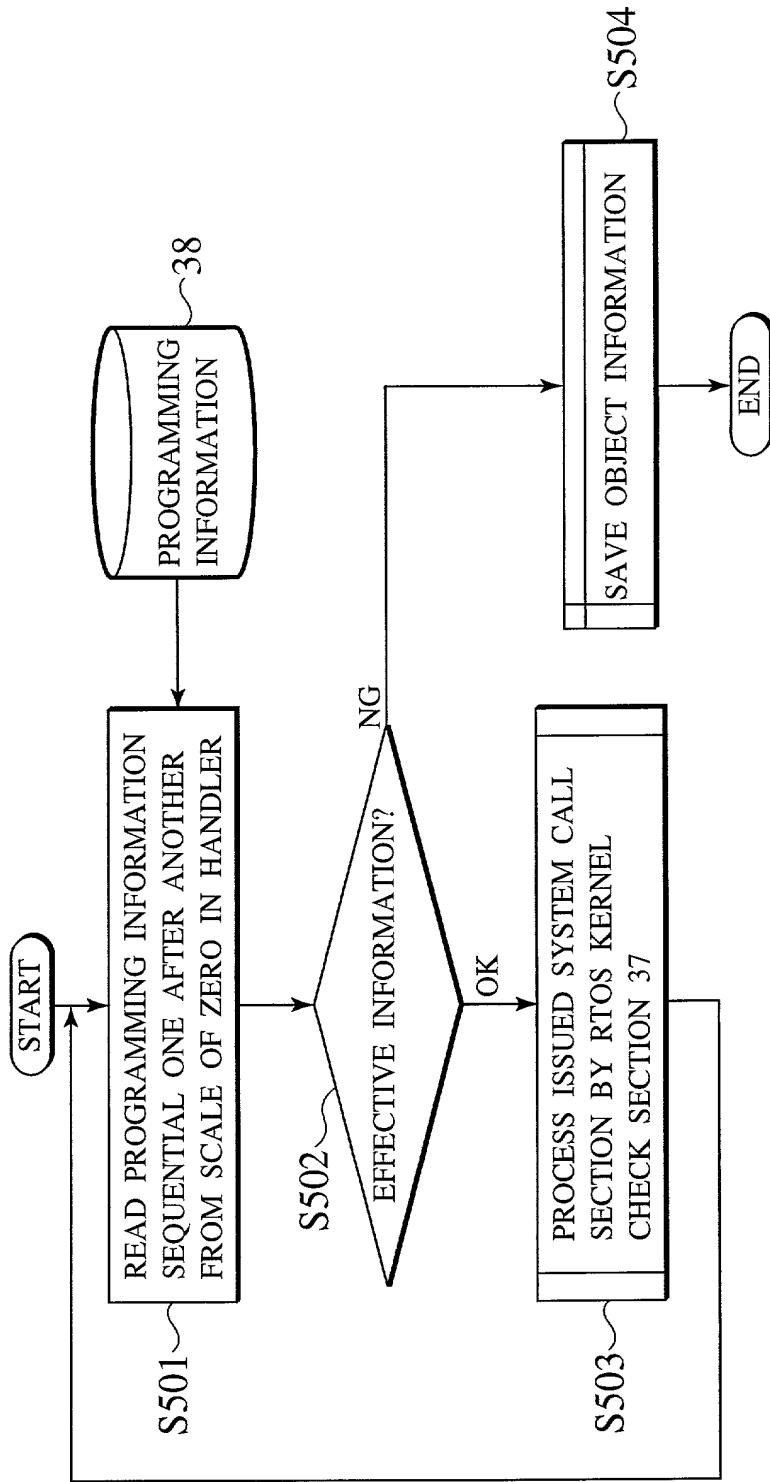


FIG.42



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FIG.43

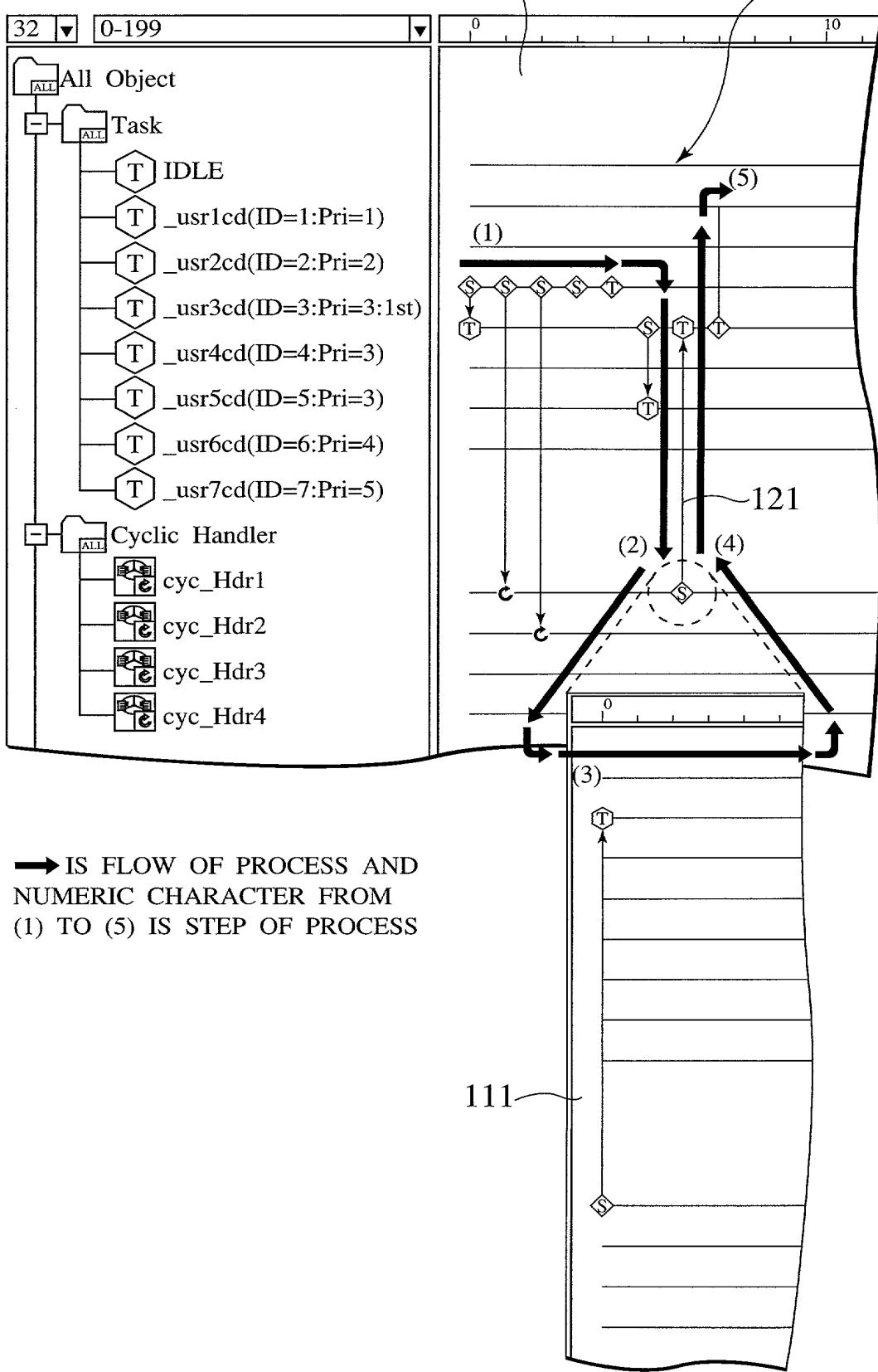


FIG.44

